ABSTRACT

A method of determining the nitrogen content of a nitrided gate oxide layer on a semiconductor substrate is provided. The method comprises steps of: oxidizing the nitrided gate oxide layer; measuring the thickness of the oxidized nitrided gate oxide layer; optionally determining the change in thickness of the oxidized nitrided gate oxide layer; and determining if the measured thickness or calculated change in thickness exceeds a predetermined level. The oxidizing step may be conducted in a conventional furnace or in a rapid thermal processing (RTP) chamber. In a preferred embodiment of the invention, the method further comprises measuring the thickness of the oxidized nitrided gate oxide layer for a plurality of samples having known nitrogen contents and performing a least squares regression analysis on the data to generate a calibration curve for nitrogen content as a function of oxidized nitrided gate oxide thickness. The calibration curve can be used to correlate the oxidized nitrided gate oxide thickness with the nitrogen content of the nitrided gate oxide layer. A system and a method for statistical process control of the nitrogen content of nitrided gate oxide layers using the measured thickness of the oxidized nitrided gate oxide layer is also provided.